Wireless LCD SportMeter using Motion Sensor

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Project Overview
We have developed an iPhone Sport meter that can collect information and data of users when they are walking and running. By using the iPhone Software Development Kit, we can write programs to control the motion sensors in iPhone. The iPhone will act as a signal analyzer and user interface to show datasets like number of steps, distance, speed, etc.

Features
- FUNCTIONALITY: There are sufficient functions in our sport meter
- ACCURACY: We will try to minimize our error rate by conducting a lot of experiments.
- FLEXIBILITY: Users can hold it in palms, wrists, upper arm and lower arm.
- USEFULNESS: It can apply to walking, running and other step-related functions.

Methodology
Stage 1: Hardware Testing and development platform setup
- iPhone Software Development Kit of Apple Inc
- Mac OS X 10.5.8 on an Intel x86 PC
Stage 2: Sample signals collection
- Experiments conducted on running machine in gym room
- Six sets of experiments: Walking, Slow Running and Fast Running held on hands and arms individually
Stage 3: Algorithm Design
- PCA (Principle Component Analysis)
- Framing
- Gravity Offset
- Finite Impulse Response Filter
- Cut-off Frequency
- Match Filter
Stage 4: Experiments and Analysis
Stage 5: Discussion and Conclusion

Results:
It is more accurate when the iPhone SportMeter was held at upper arm than in hand. Absolute error time is always below 10%.